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Abstract

DYNAMICS OF WATER-MODERATED WATER-COOLED REACTORS AT ACCIDENTAL DROP OF COOLANT CIRCULATION

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The first part of the work contains a system of equations to be employed for computing the change of the coolant circulation in the primary circuit of the multipool water-moderated water-cooled reactor when the operating conditions of the circulating pumps are changed or disturbed. Conditions of system consistency are cited. Analytic solutions of some cases are given.

A detailed analysis of the circulating pump deenergizing or breaking is made. Typical time constants for drop of circulation are obtained and analyzed for different reactors employing various types of circulating pumps.

The analytic solutions are compared to the computer calculations and experimental data. Performance of a bench test for determining the drop of coolant circulation is highly recommended.

In the second part of the work an analysis is made of the heating conditions in the water-moderated water-cooled reactor in case of pump deenergizing. The reactors with various types of fuel elements are considered. Criteria are obtained which will allow the operators to keep the heating conditions in the reactor within the specified limits (for instance, lack of coolant bulk boiling and heat exchange crisis or maximum tolerable temperature of the fuel element in case of heat exchange crisis). Some calculated data are cited which are compared to the available experimental data.

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